



## EXPERIMENTAL IMAGING

The development of innovative treatment approaches is closely linked to the continuous monitoring of the treatment success, but also of possible adverse events. MRI and PET imaging are state-of-the-art technologies for this purpose. Next to anatomical imaging of the brain, numerous options for functional imaging and even for visualization of cellular and metabolic processes are possible using these modalities. In parallel, imaging protocols relevant for stroke diagnosis and monitoring are already in use in preclinical animal models. Moreover, novel diagnostic tools can be developed in an efficient manner.

The effective application of modern imaging modalities requires interdisciplinary collaboration between different scientific fields and institutions. Fraunhofer IZI therefore collaborates with many expert imaging teams, for example, from the departments for diagnostic radiology and nuclear medicine from the University of Leipzig.

### Unique Feature

Combined MRI- and PET-imaging in the large animal model.

### Methods

The impact of diagnostic and therapeutic strategies and interventions can be investigated and analyzed in small and large animal models. Repeated insights into neuropathological processes and regeneration ensure effective therapy monitoring.

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### Investigation Methods

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- CT: anatomic imaging, diagnosis of tumor formation and bleedings
- MRI: detailed anatomic and functional imaging
- PET: functional imaging, visualization of metabolism
- PET / CT: parallel anatomical imaging, visualization of metabolic processes and molecular imaging

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### Selected Applications

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- Development of diagnostic tools for ischemic stroke
- Early diagnosis of adverse events (tumor formation, bleedings) throughout therapy development
- Assessment of lesion size, visualization of cell migration and brain atrophy following stroke
- Visualization of proliferation and differentiation in the adult brain
- Identification and quantification of fiber tracts
- Combined imaging for parallel anatomical and functional imaging
- Correlation with results from behavioral phenotyping and histology to verify therapeutic success at different levels of regeneration

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### Reference Project

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Modern imaging techniques performed together with partners from the university departments of neuroradiology and nuclear medicine are crucial tools of state-of-the-art therapeutic monitoring. Moreover, challenging problems can be solved or investigated using only imaging techniques. For instance, the Neurorepair Research Group actually investigates the anatomy of the venous drainage of the ovine brain. This vessel system is not yet described even in veterinary anatomy. Moreover, migration of magnetically labelled cell populations can be tracked in the body non-invasively.